ECONOMICS, FORESTRY & LAND USE:

A Policy Analysis Framework, With Emphasis on Tenure Security & Land Allocation

Based on Work by:
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NRM/EPIQ Program
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Economic Policy, Forestry, & Land Use

OBJECTIVES

- To organize issues of forestry, environment, tenure & land use in an economic framework
- To identify different land uses according to economic criteria
- To analyze impacts of alternative economic policies on different land uses
- To illustrate how tenure & uncertainty enter the framework and affect sustainable land uses
- To show how land use allocations may not match economic incentives

Economic Policy, Forestry, & Land Use

CONTENT

- DEVELOPING THE FRAMEWORK: Spatial & Economic Model of Land Use
- POLICY ANALYSIS CASES: Economic Policy "Shifters"
- IMPORTANT CASE: Costs of Secure Property Rights
- IMPLICATIONS: Land Use Allocation Schemes
- CONSIDERATION OF: Practical Uses, Special Cases
- LONGER TERM DIRECTIONS: Link Economic Modeling, Spatial & Development Planning

Economic Policy, Forestry, & Land Use

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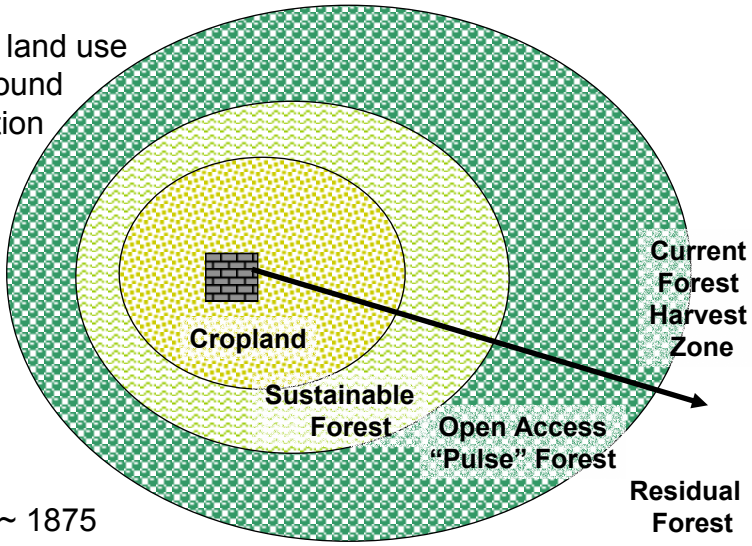
A Spatial & Economic Model of Land Use

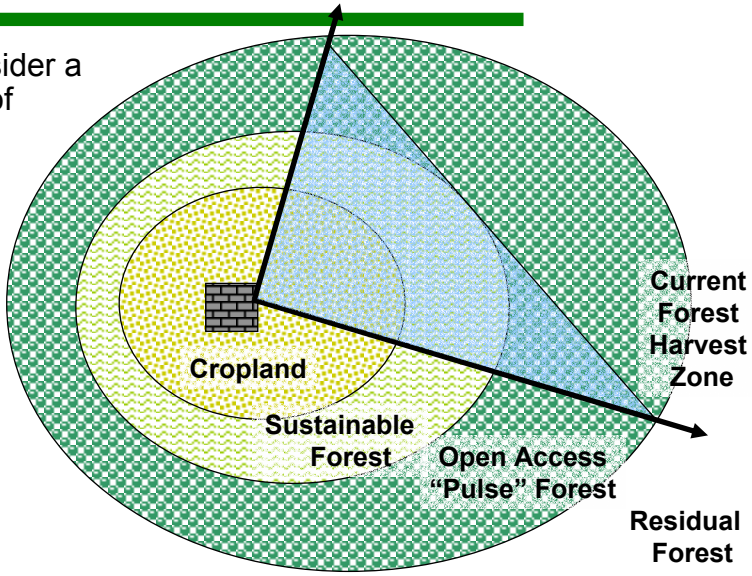
Consider land use zones around a population center



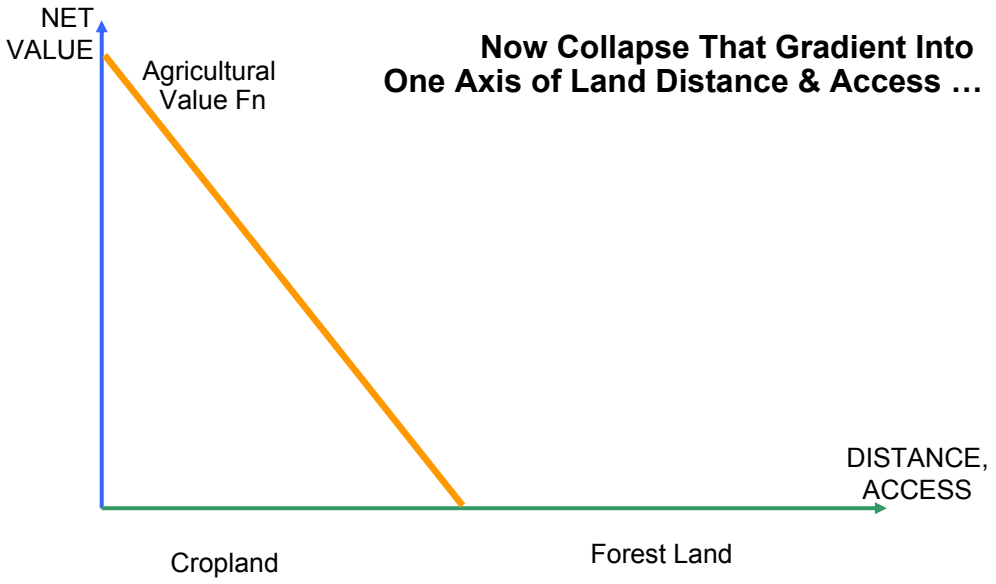
Von Thunen, ~ 1875
Hyde, Amacher & Magrath (1996)

A Spatial & Economic Model of Land Use

Now consider a gradient of economic value changing with distance, access, & land quality



DEVELOPING THE FRAMEWORK



Now Collapse That Gradient Into One Axis of Land Distance & Access …

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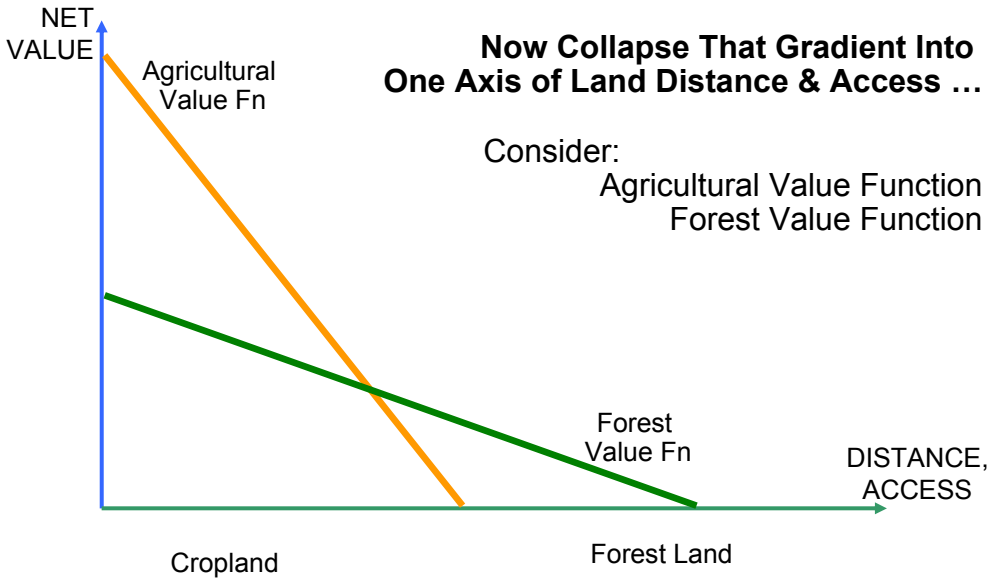
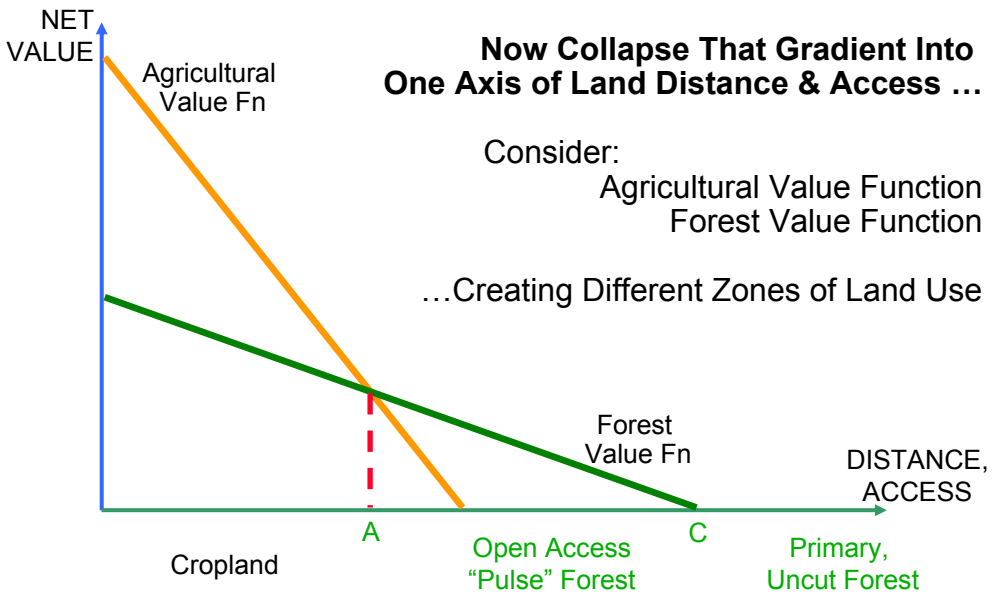


Now Collapse That Gradient Into One Axis of Land Distance & Access …

Consider:
Agricultural Value Function
Forest Value Function

DEVELOPING THE FRAMEWORK

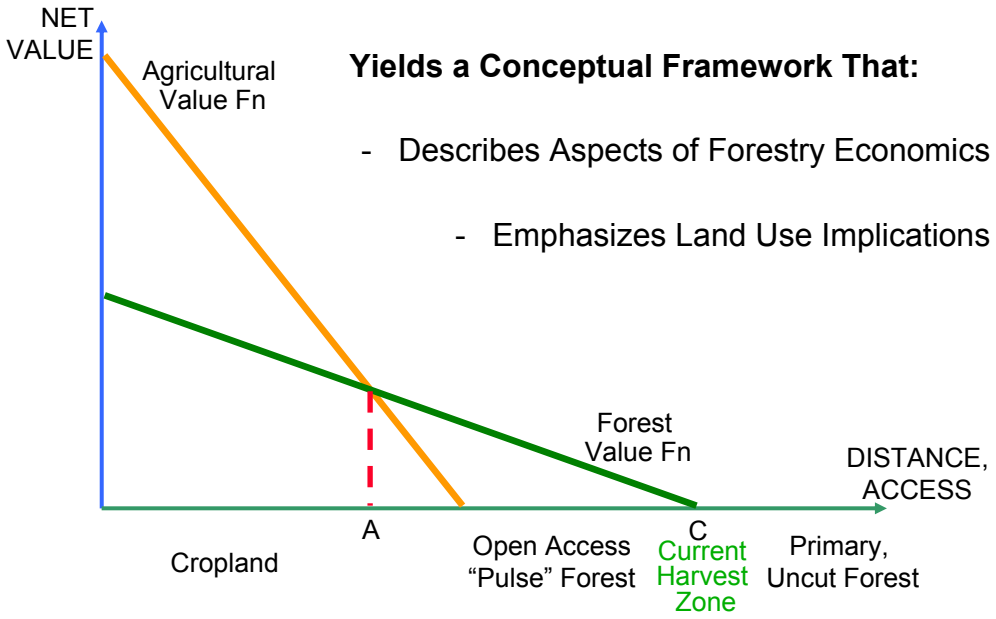


Now Collapse That Gradient Into One Axis of Land Distance & Access …

Consider:
Agricultural Value Function
Forest Value Function

…Creating Different Zones of Land Use

DEVELOPING THE FRAMEWORK



Yields a Conceptual Framework That:

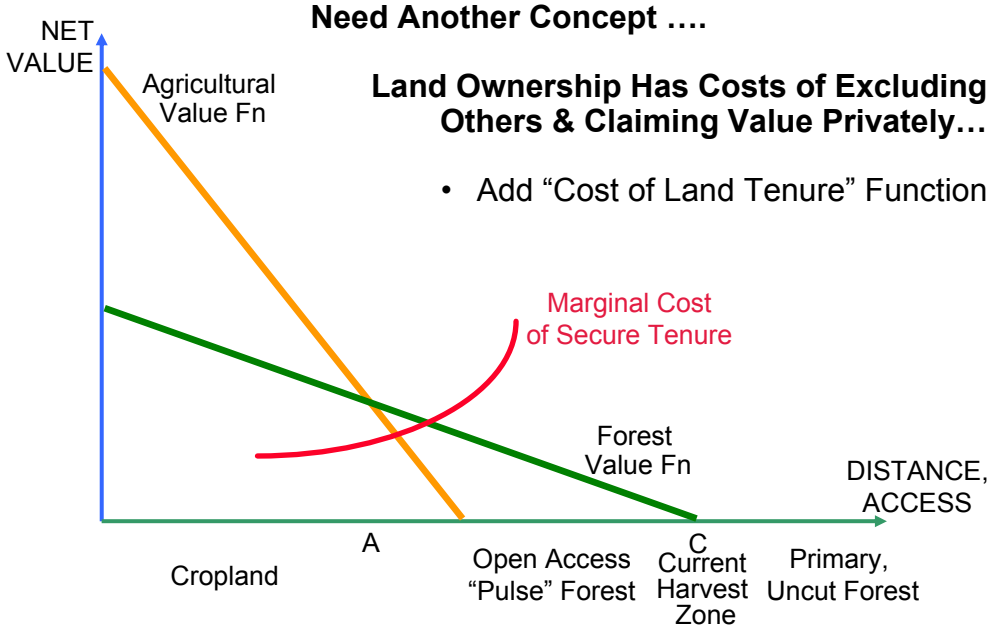
- Describes Aspects of Forestry Economics
- Emphasizes Land Use Implications

DEVELOPING THE FRAMEWORK

Need Another Concept ….

Land Ownership Has Costs of Excluding Others & Claiming Value Privately…

- Add "Cost of Land Tenure" Function

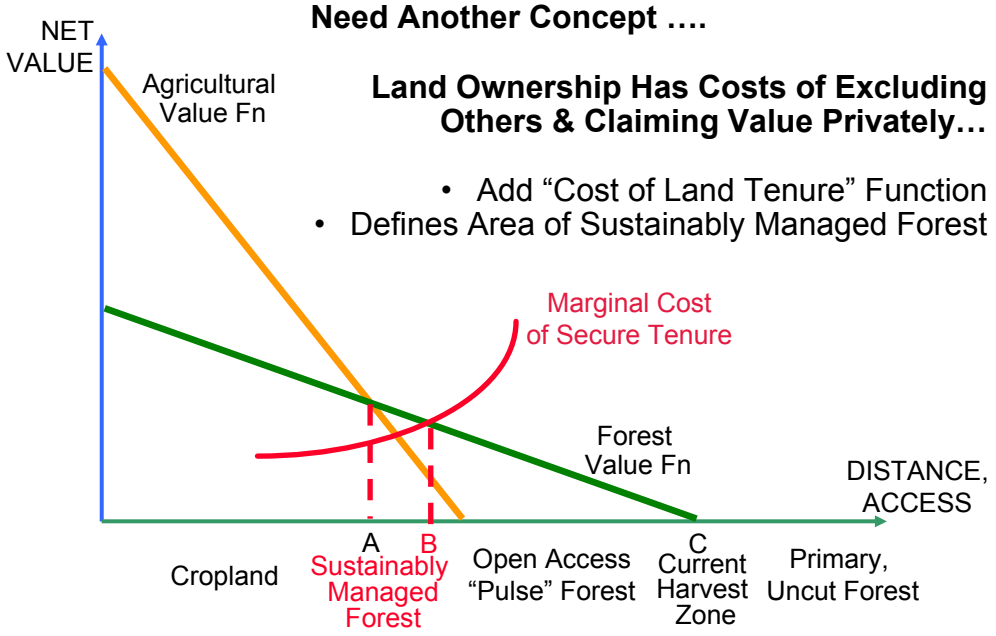


DEVELOPING THE FRAMEWORK

Need Another Concept ….

Land Ownership Has Costs of Excluding Others & Claiming Value Privately…

- Add "Cost of Land Tenure" Function
- Defines Area of Sustainably Managed Forest



SUMMARY: Land Use Categories

Forest lands include five ***use categories***

- Managed forest plantations and small holder-managed trees ("Sustainable Forest")
- Degraded (mostly logged-over) forest lands (Open Access, or "Pulse" Forest)
- Natural forests that are open to harvesting (now or soon (Current Harvest Area)
- Natural forests beyond margin of harvest opportunity (Primary, Uncut Forest)
- Protected forests (for non-economic reasons, not shown on the figure)

These are analytically distinct for policy purposes

SUMMARY: Economic Policy "Shifters"

Four main types of policies affecting forest lands:

- Policies that directly affect ***forest values***, such as fees, taxes, etc.
- Policies that affect ***property rights***, or who manages the forest and with what incentives
- ***Agricultural policies*** that affect the land margin between agriculture and forestry
- ***Environmental policies*** to protect long run sustainability of environment or unique forest resources.

Different results for different land use categories…

Economic Policy, Forestry, & Land Use

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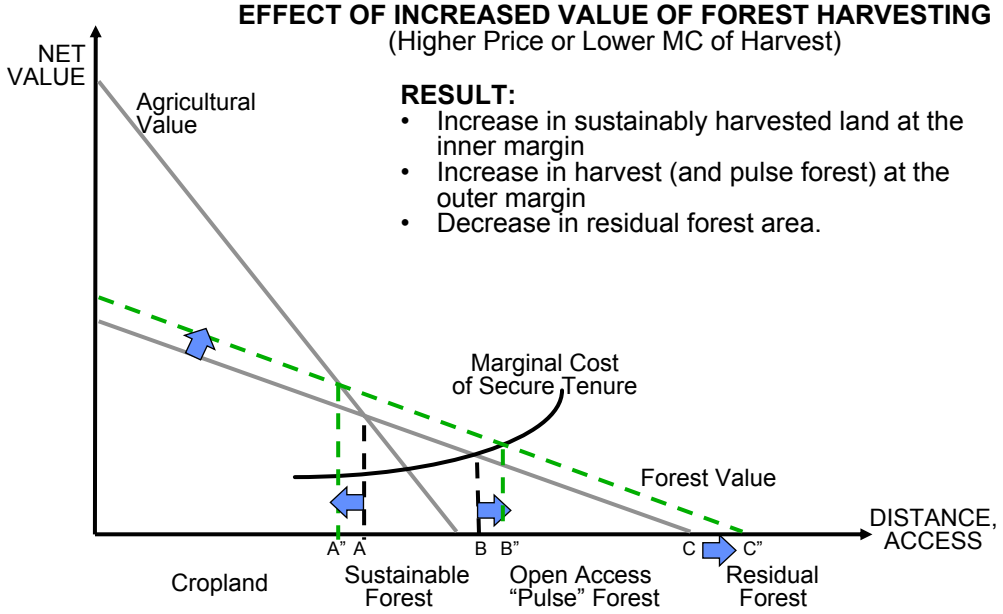
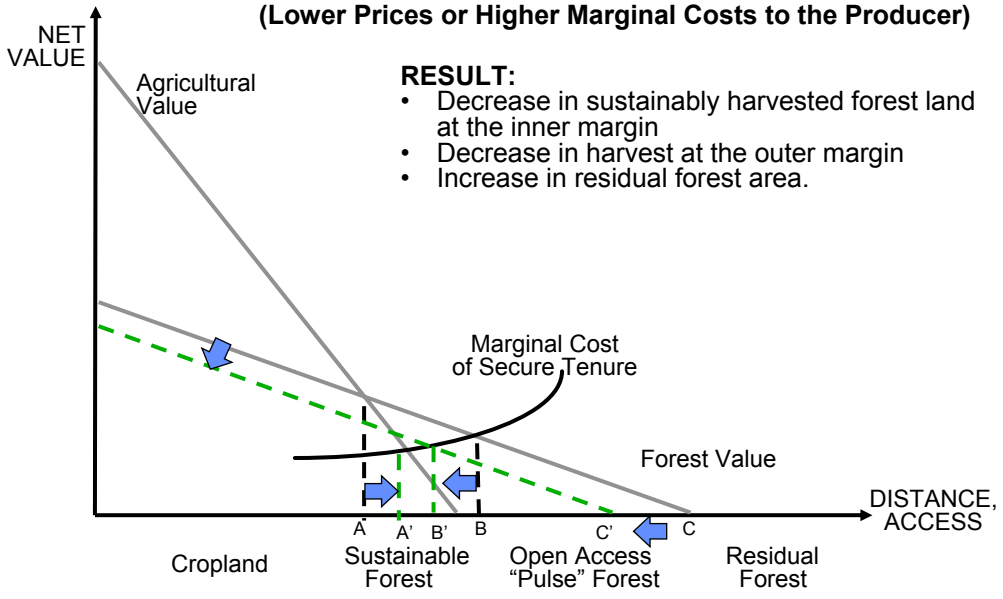
POLICY ANALYSIS 1:
EFFECT OF INCREASED VALUE OF FOREST HARVESTING
(Higher Price or Lower MC of Harvest)

RESULT:
- Increase in sustainably harvested land at the inner margin
- Increase in harvest (and pulse forest) at the outer margin
- Decrease in residual forest area.



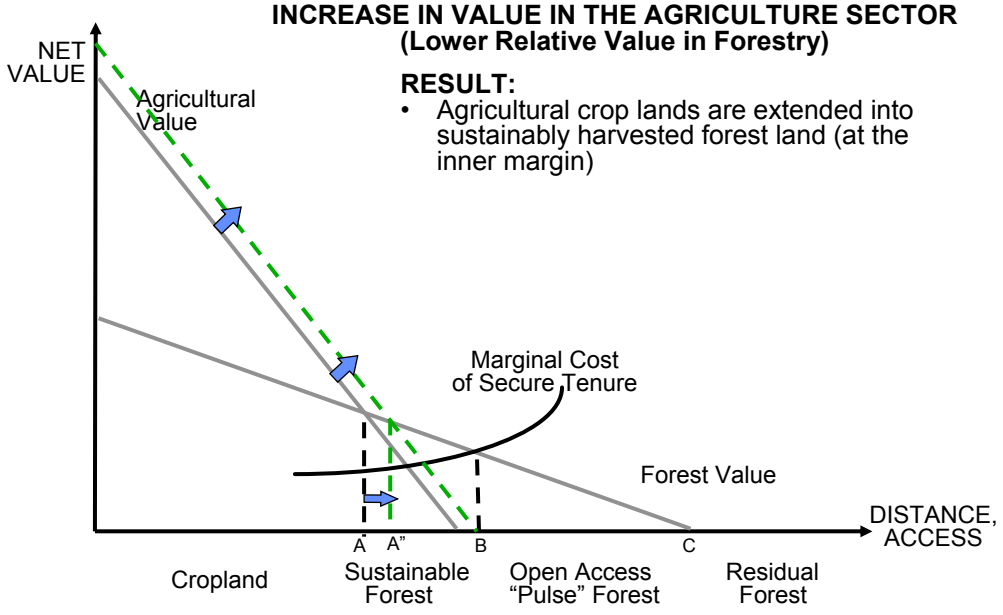
POLICY ANALYSIS 2:

DECREASE IN VALUE OF FOREST HARVESTING
(Lower Prices or Higher Marginal Costs to the Producer)



POLICY ANALYSIS 3:

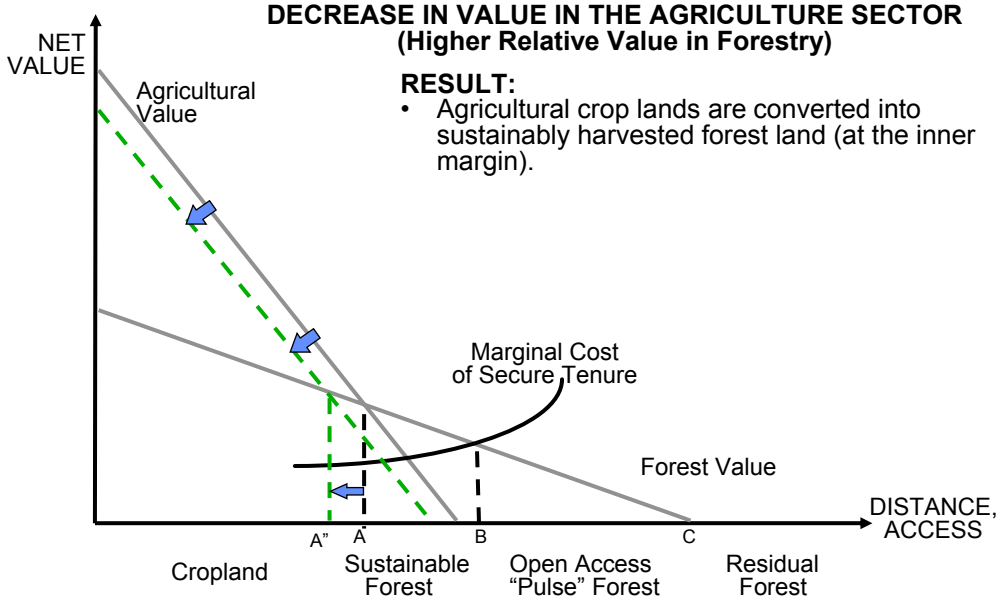
INCREASE IN VALUE IN THE AGRICULTURE SECTOR
(Lower Relative Value in Forestry)



POLICY ANALYSIS 4:

DECREASE IN VALUE IN THE AGRICULTURE SECTOR
(Higher Relative Value in Forestry)

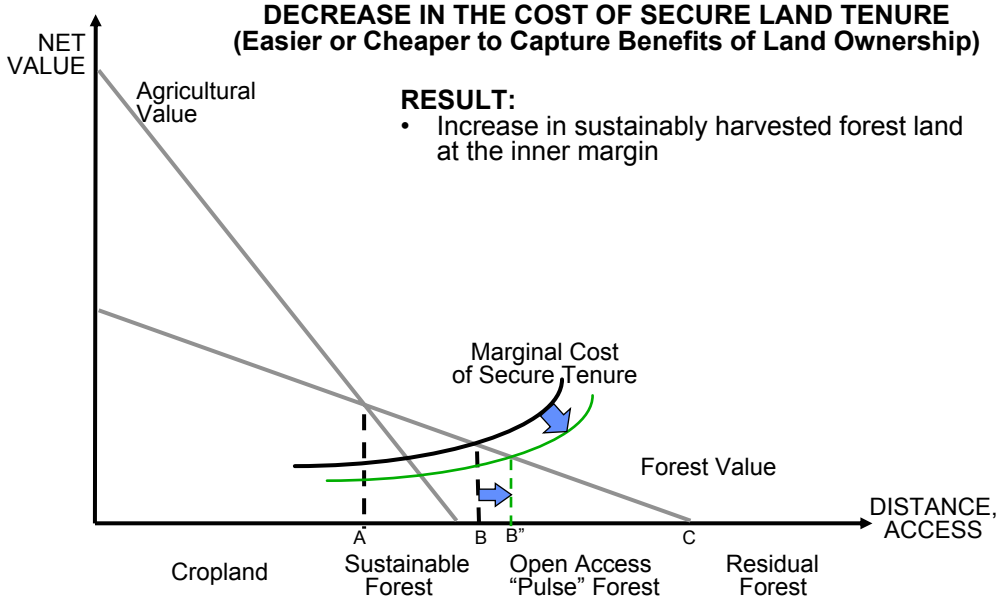
RESULT:
- Agricultural crop lands are converted into sustainably harvested forest land (at the inner margin).



POLICY ANALYSIS 5:

DECREASE IN THE COST OF SECURE LAND TENURE
(Easier or Cheaper to Capture Benefits of Land Ownership)

RESULT:
- Increase in sustainably harvested forest land at the inner margin



SUMMARY: Implications For Policy Change

- Policy changes -- fees, taxes, charges, subsidies, restrictions, incentives for land management -- all trace their impacts through these shifters
  - E.g., Policies that affect institutional or legal environment, such as marketing restrictions, affect both rights and harvest values
- Policies that affect forest lands have different effects on each of five land use types -- sometimes conflicting or counter-intuitive:
  - Raising forest values increases incentive to manage some (closer, better) land sustainably
  - But also increases incentive to harvest more at the primary forest margin (unsustainably)

SUMMARY: Need To Integrate Reforms

Proposed reforms need to be viewed from a broad perspective of land use:

- Policies must be analyzed in an integrated fashion
- Must consider how they complement or enhance each other
- May need supporting policies (e.g., enforcement and monitoring)
- Institutional reforms may be as important as traditional economic shifters
- That is, community forestry rights, codes for environmental protection, not only taxes or quotas

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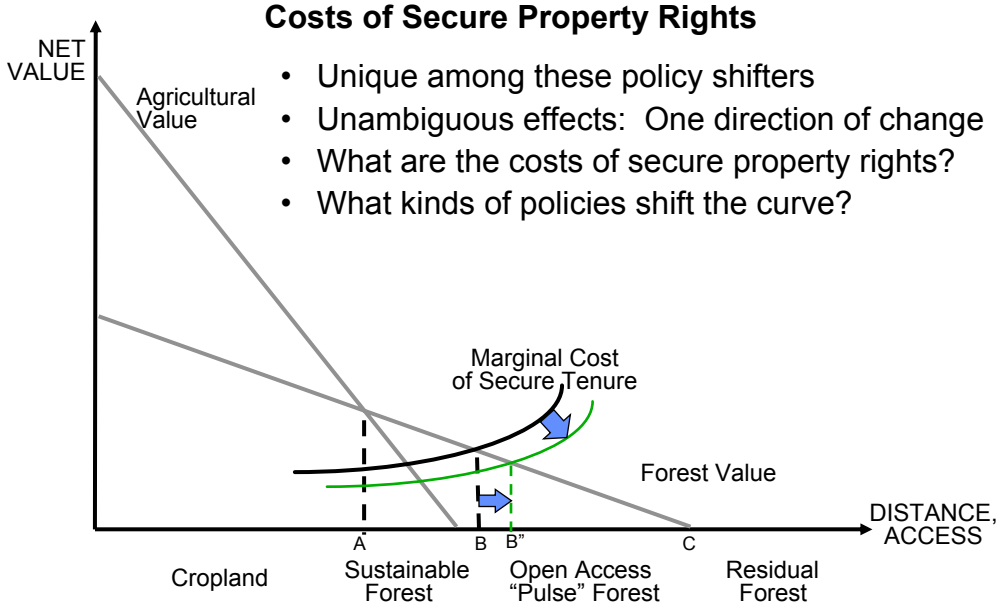
IMPORTANT CASE: Costs of Secure Property Rights

- Unique among these policy shifters
- Unambiguous effects: One direction of change
- What are the costs of secure property rights?
- What kinds of policies shift the curve?



Costs of Secure Property Rights

What decreases costs of establishing/maintaining land rights?

- Clarifying rights or reducing any uncertainty surrounding the prevailing rights
- Decreasing the costs of establishing and maintaining the rights themselves

Improving security of ownership rights can:

- Decrease costs, e.g., decreasing needs for fencing
- Increase returns, if landowner can recover more from long-term investments

⇨ Increases area under sustainable management.

Costs of Secure Rights: Two Kinds of Uncertainty

Uncertainty raises costs of securing rights. May be due to:

- *Conflict* between formal rights holders & informal users
  - E.g., Gov't agency may hold formal rights
  - May not be able to enforce rules, exclude informal users
- *Political environment* in flux (even if land rights are certain)
  - E.g., Macro instability, military activity
  - Actions outside forest sector

⇨ Owners/managers cannot make long-term decisions with confidence

Costs of Secure Rights: Uncertainty & Conflict

- Returns from land use decisions by either formal owner or local user may accrue to the other
- Investments in sustainable activities (planting, clearing) by one party may be damaged by actions of the other
- Long term investments cannot be realized by either party
- Makes most sense to remove whatever immediate products are available -- from the perspective of either party.

⇨ Extractive land uses & deforestation without replacement.

Costs of Secure Rights: Uncertainty & Political Flux

Doubts about continued rights – even for legal users

- Those with rights:
  - o May perceive risk of losing their claims
  - o Strive to claim market rewards while they own the rights
- Those without rights:
  - o May perceive lower risk of monitoring
  - o Greater opportunity for trespass and theft with impunity

Tenure security often decreases farther from seat of gov't:

- Infrastructure to support formal legal arrangements declines
- Frontier-style political activity: Local special interests make (or take…) the law

Costs of Establishing & Maintaining Rights

In formal or developed economies, costs may include:

- Registering deeds
- Building fences or patrolling
- Ensuring ownership (legal system functioning)

In less formal economies, costs may depend on:

- Rules defined by local custom
- User's role in the community
- Access to community decision makers

Decreasing these costs may be possible by:

- Opening regional government offices for title registration
- Finding less expensive fencing technologies, monitoring
- Improving access to local or traditional authorities

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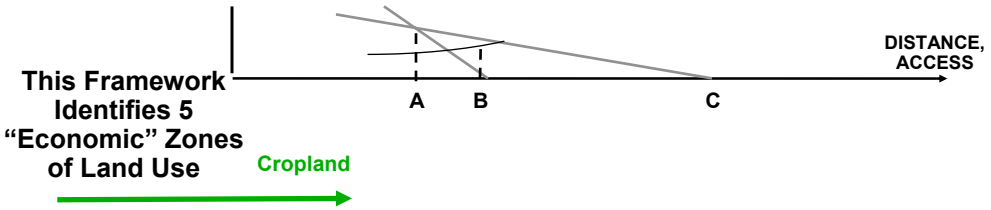
IMPLICATIONS: Land Use Allocation Schemes

As noted, framework defines five “economic” zones of land use

How do these compare to administrative allocations of land?

IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES



This Framework Identifies 5 “Economic” Zones of Land Use

Cropland

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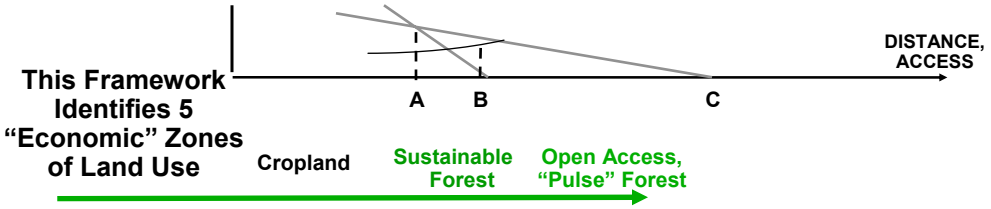

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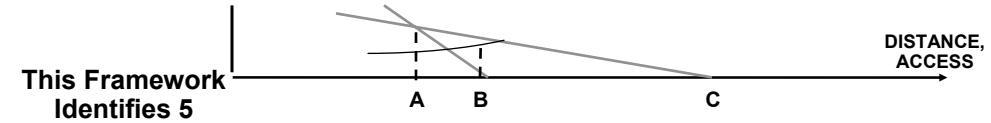

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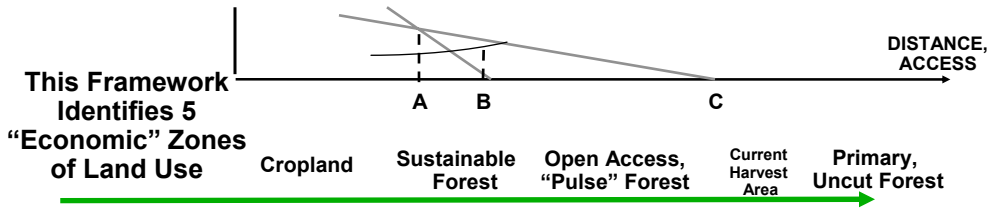

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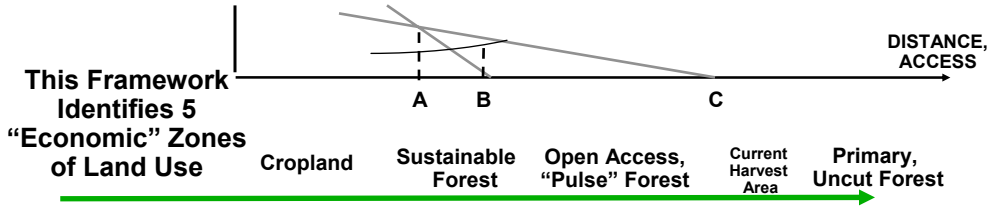
In Indonesia, As Many Places, There Is Also an "Administrative" Scheme for Allocation of Land

IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES



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Cropland

Conversion "Forest"

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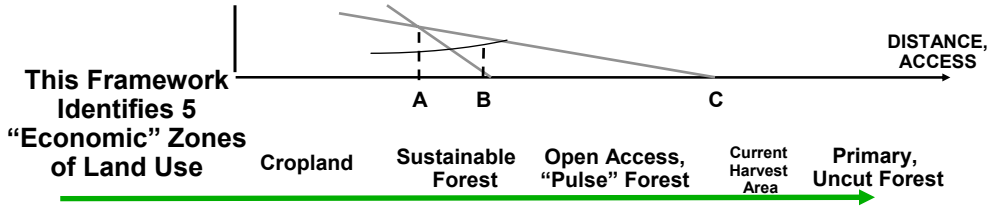

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Cropland

Conversion "Forest"

Production Forest

Protection Forest

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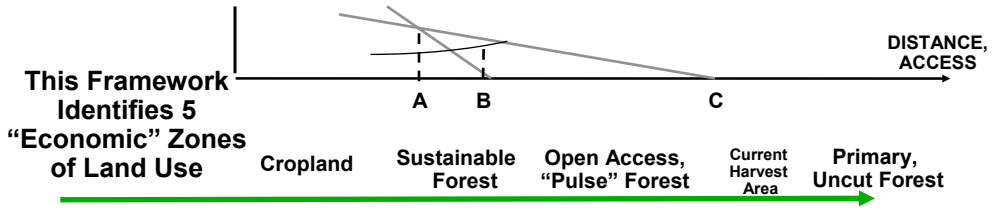
IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES



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Protected Land, Parks

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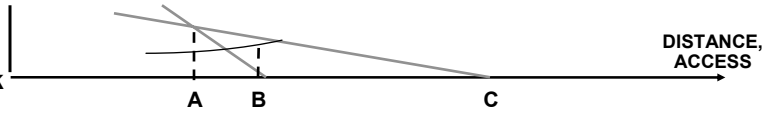
IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES



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Cropland

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Protected Land, Parks

In Indonesia, As Many Places, There Is Also an "Administrative" Scheme for Allocation of Land

How do the two schemes compare?

IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES

Administrative Allocation of Land \ Economic Allocation of Land	Cropland	Sustainable Forest	Open Access, "Pulse" Forest	Current Harvest Area	Primary, Uncut Forest
Cropland					
Conversion "Forest"					
Production Forest					
Protection Forest					
Protected Land, Parks					

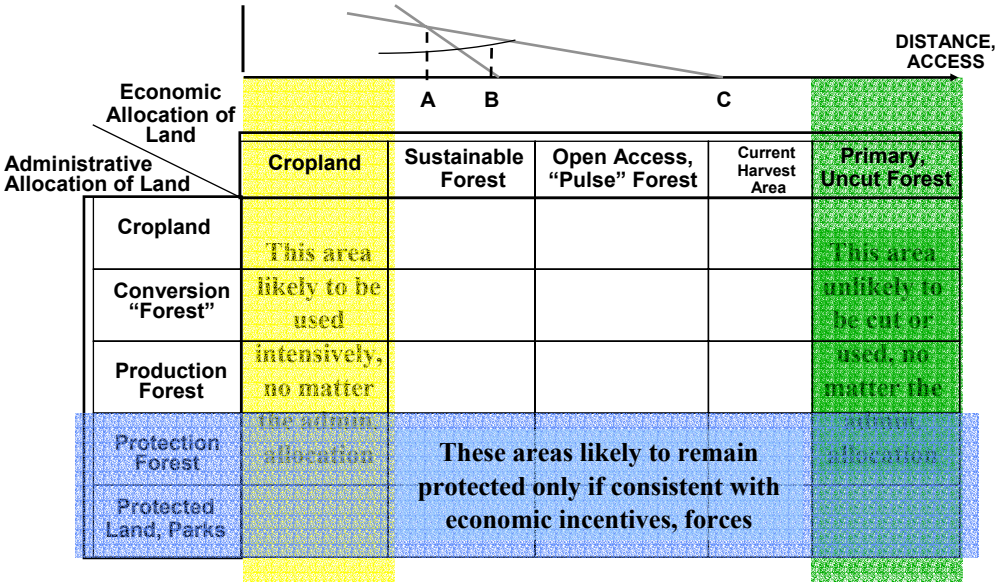
IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES

Administrative Allocation of Land \ Economic Allocation of Land	Cropland	Sustainable Forest	Open Access, "Pulse" Forest	Current Harvest Area	Primary, Uncut Forest
Cropland					This area unlikely to be cut or used, no matter the admin. allocation
Conversion "Forest"					
Production Forest					
Protection Forest					
Protected Land, Parks					

IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES

Administrative Allocation of Land \ Economic Allocation of Land	Cropland	Sustainable Forest	Open Access, "Pulse" Forest	Current Harvest Area	Primary, Uncut Forest
Cropland	This area likely to be used intensively, no matter the admin. allocation				This area unlikely to be cut or used, no matter the admin. allocation
Conversion "Forest"					
Production Forest					
Protection Forest					
Protected Land, Parks					

IMPLICATIONS FOR LAND USE ALLOCATION SCHEMES



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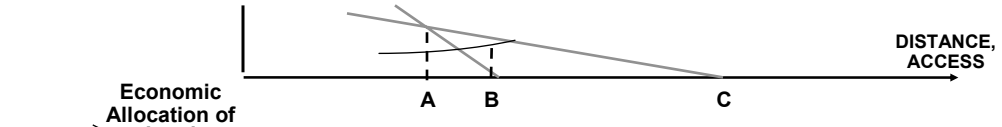

Administrative Allocation of Land \ Economic Allocation of Land	Cropland	Sustainable Forest	Open Access, "Pulse" Forest	Current Harvest Area	Primary, Uncut Forest
Cropland	Properly Allocated	Economically Unlikely	Economically Unlikely	Econ. Unlikely	Economically Protected
Conversion "Forest"	Properly Allocated	Properly Allocated	Economically Unlikely	Econ. Unlikely	Economically Protected
Production Forest	Economically Threatened	Properly Allocated	Properly Allocated	Properly Allocated	Economically Protected
Protection Forest	Economically Threatened	Economically Threatened	Economically Threatened	Econ. Threat	Economically Protected
Protected Land, Parks	Economically Threatened	Economically Threatened	Economically Threatened	Econ. Threat	Properly Allocated

IMPLICATIONS: Land Use Allocation Schemes

Admin. allocations often don't match econ. incentives

- Regreening or planting schemes in isolated or marginal areas will not be sustained (e.g., transmigration)
- "Production Forests" close to populations & markets will tend to look like open access forests (Kutai area)

Where incentives match, management is easier

- Agriculture or agro-forestry near markets & transport make sense and evolve naturally
- Parks in remote areas don't need much management (e.g., BB-BR NP)

Where incentives do not match, plan for cost or conflict

- For parks in high economic value zones, be prepared for cost of exclusion & protection
- For "protection forests" inside concessions near markets, expect to find more crops than protection

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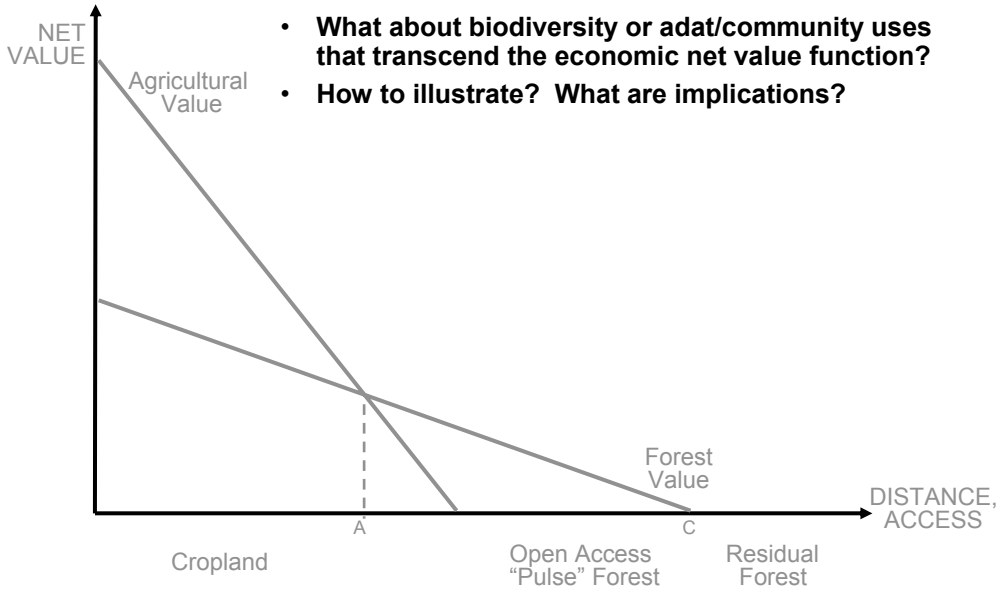
CONSIDERATION: Practical Uses, Special Cases

- "Distance, Access" Axis is quite complex, not one dimension
- Real world is dynamic
- Roads, rivers, & migrating populations can change spatial gradient of values
- In broader regional perspective, could have many population centers with overlapping zones of use
- At local level, could have small scale uses & users (adat communities) with different value scheme
- Doesn't include environmental, biodiversity considerations and values, except indirectly through "net value" function

…Still, framework provides some useful insights and hopes for more empirical application

CONSIDERATION OF "SPECIAL VALUES"



- **What about biodiversity or adat/community uses that transcend the economic net value function?**
- **How to illustrate? What are implications?**

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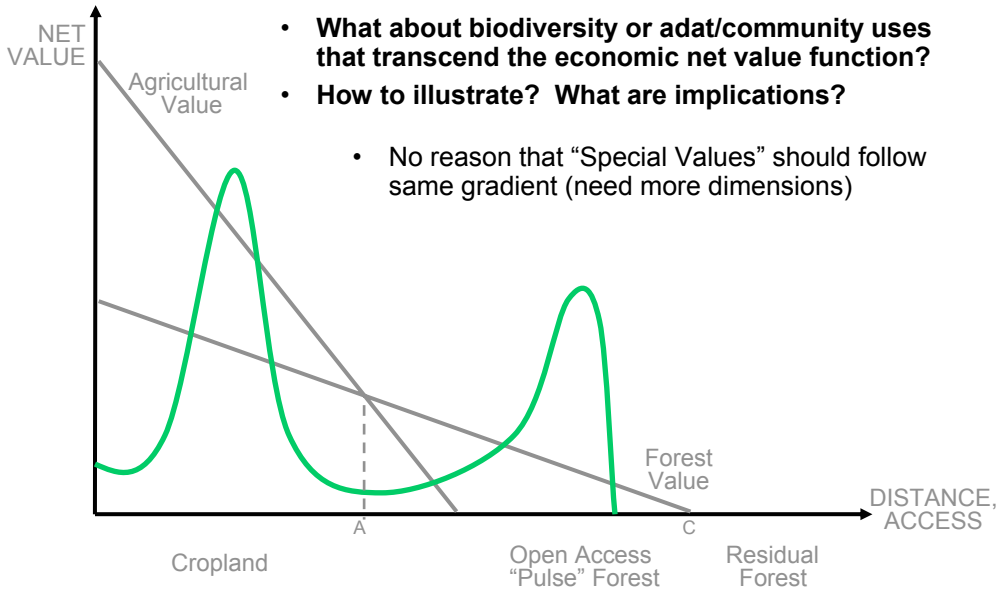

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  - No reason that "Special Values" should follow same gradient (need more dimensions)

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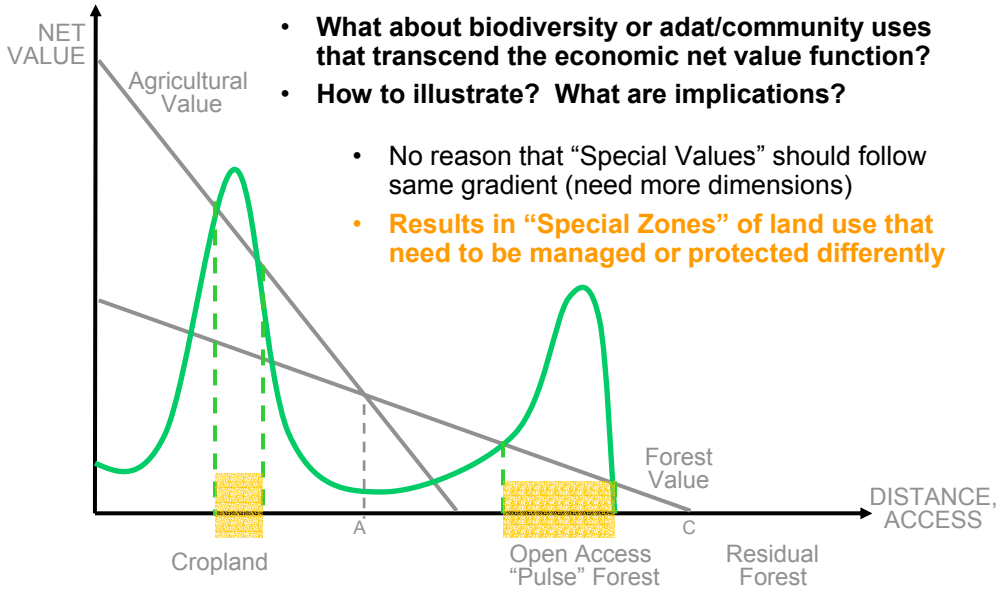

- **What about biodiversity or adat/community uses that transcend the economic net value function?**
- **How to illustrate? What are implications?**
  - No reason that "Special Values" should follow same gradient (need more dimensions)
  - **Results in "Special Zones" of land use that need to be managed or protected differently**

F. LONGER TERM DIRECTIONS: LINK ECONOMIC MODELING, SPATIAL & DEVELOPMENT PLANNING

Possibilities:

- Could produce integrated economic-geographic analysis of spatial or development plans
- Improve provincial NR planning with concrete economic analysis dimension
- Demonstrate links between regional plans, resource values, & land uses at regional level
- Improve land and resource allocation decisions, esp. toward econ. development goals

Activities, Starting Small:

- Feasibility study to assess/demonstrate demand & usefulness
- Investigate data sources, mapping capabilities, modeling efforts, potential collaborators
- Begin with “overlay” of econ. data onto GIS to illustrate implications for development
- Determine how to feed geographic-based info/results into existing regional econ. models
- Develop criteria for & identify case study areas, with regional governments & universities
- Use case studies to test technical approaches, demonstrate results

Longer Run:

- Assess targets, allocations in development plans, based on econ. model predictions
- Evaluate env.-econ. implications of proposed economic development strategies